

UDOT & USU Biodiesel Experiment

What crops will be grown?

Crops considered are all adapted to be grown on marginal agricultural lands and in dryland conditions (14+ inches of precipitation per year)

- Canola – is a group of cultivars of rapeseed variants from which low erucic acid oil and low glucosinolate meal are obtained. In this experiment, fall and spring round up resistant varieties are being utilized. (not going into food chain!)
- Safflower – Safflower is one of humanity's oldest crops, is a highly branched, thistle-like annual. plants are 30 to 150 cm tall with globular flower heads and commonly, brilliant yellow, orange or red flowers which bloom in July. Safflower has a strong taproot which enables it to thrive in dry climates, but the plant is very susceptible to frost injury from stem elongation to maturity.
- Perennial Flax – Is a native to Europe, primarily in the Alps, is a slender perennial growing to 60 cm tall, flowers are pale blue, 2-2.5 cm diameter, with five petals.



Canola



Safflower



Flax

Will they need watering?

Watering would increase yields – but our model does not require irrigation – just natural precipitation

How difficult is planting and harvesting of the crops?

Not difficult at all. We utilize conventional farm equipment – tractor, grain drills and combines.

How large is the test area?

Approximately 1100 feet by 8 feet

How many test areas are there?

Five, these are located in Tremonton, Kaysville, and Mona.

How much biodiesel will be created from those test areas?

About 15 gallons (actual crop size is about ¼ of an acre)

How much biodiesel does one acre of crops provide?

Between 50 and 60 gallons

How much UDOT land could potentially be seeded?

UDOT maintains 6000 miles of roads. It is estimated that half of that mileage would be able to be cultivated. UDOT lands could potentially produce about 500 gallons/mile of Biodiesel. Assumptions:

- 100 Foot Wide Growing Region per Mile
- Use Conventional Agronomic Methods and Equipment
- 66% Dry Land Yields

When will we know if it was successful?

It should take us around 2-3 years

How do we turn the seeds into fuel and how long does it take?

We press the seeds with a seed press to get the oil from the seed. We place the oil into vessel and react the oil with a catalyst and esterifier. We separate the biodiesel from the waste products produced in the reaction (glycerin) and water if used.

How expensive is the refining process?

Around 60 cents per gallon

There seem to be problems with Ethanol and whether or not it really saves energy and fuel costs, will this be similar?

Ethanol traditionally has been made from agronomically grown crops such as corn. In this setting, it is only a catalyst for the starting of using ethanol - rather than a long-term solution. No one is arguing that the .3 units (at best) of energy balance that we get from ethanol is a real sustainable model but it is a start.

This leads to the research and production of other biowaste materials (crop residues, orchard prunings, etc.) that can be utilized and co-utilized as feedstock for making ethanol. If we utilize waste materials for production of ethanol, then we become more sustainable and the energy balance become much more favorable. Long term ethanol may not be the energy carrier of choice for sustainability.

On that note, we must single out biodiesel from ethanol in terms of energy balance. We are getting almost twice the energy from the biodiesel what we put in. Also, the biodiesel movement has been basically started on utilizing waste oils in a non-segregated way.

Within the biodiesel research, there is a general knowledge that we will not be able to produce enough oil seed crops agronomically to satisfy the needs of the USA or world. The biodiesel community is rapidly turning to more sustainable models of oil production, such as aquatic organisms, which utilize waste streams of water produced by us.

When do we harvest the crops?

Late fall of this year.

How much money is this test costing?

\$57,200 for the first two years.

Is there going to be more testing next year and will the experiment expand?

We are planning on this. We are searching for more funding and waiting to see what the results will be from the first year.

What vehicle types can use this fuel?

Biodiesel is registered as a fuel and fuel additive with the Environmental Protection Agency (EPA) and meets clean diesel standards established by the California Air Resources Board (CARB). The Department of Energy (DOE) and the US Department of Transportation (DOT) have designated neat (100 percent) biodiesel as an alternative fuel. "National Biodiesel Board Diesel Fuel – any diesel engine can run on it.